

What is claimed is:

Sub B1
1. A sender for use in a communication system in which the sender and a receiver are connected to each other via a transmission line, said sender comprising:

a sending signal generating means for converting said input signals into carrier signals assuming values at a specific interval on the axis of frequency and free from interfering with each other, and then outputting said carrier signals.

2. A sender as defined in claim 1, wherein said sending signal generating means has:

a carrier signal generating means for generating a plurality of carrier signals with the frequencies assuming values at specific intervals; and

a multiplying means for multiplying said carrier signals by the input signals and sending out said multiplied signals on a transmission line.

3. A sender as defined in claim 2, wherein there is further provided a selection control means for controlling said carrier signal generating means with regard to the intensity distribution at the time of transmission among a plurality of carrier signals according to the transmission characteristics on said transmission line of the corresponding carrier signals detected on the receiver side.

Sub B2
4. A sender as defined in claim 2, wherein said sending signal generating means are provided for a plurality of input signals and there is further provided a sending signal synthesizing means for synthesizing the outputs from said respective sending signal generating means.

5. A sender as defined in claim 4, wherein there is provided a

plurality of carrier signals received

Sub 20. A receiver as defined in claim 14, wherein a transmission line characteristics measuring means determines the relative phase of said plurality of carrier signals received in relation to a reference phase

21. A receiver as defined in claim 14, wherein a transmission line characteristics measuring means determines both the signal intensity of said plurality of carrier signals received and the relative phase of said plurality of carrier signals received in relation to a reference phase

22. A receiver as defined in claim 19, wherein said selection control means has a lower threshold value and/or upper threshold value stored therein and selects the carrier signals, the signal intensity of which is over said lower threshold value and/or said upper threshold value

23. A receiver as defined in claim 21, wherein said selection control means has a lower threshold value and/or upper threshold value stored therein and selects the carrier signals, the signal intensity of which is over said lower threshold value and/or said upper threshold value

24. A receiver as defined in claim 20, ~~claim 21 or claim 23~~, wherein said selection control means has threshold values defining a phase range stored therein and selects the carrier signals, the relative phase value of which is within said threshold value range

25. A receiver as defined in claim 14, wherein said signal intensity is detected by a plurality of filters for the frequency bands of the carrier signals.

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26 A receiver as defined in claim 19, wherein said relative phase is detected by a relative phase detection circuit detecting the difference between the angular signals obtained from said respective filters and the reference phase

Sub 27
27 A receiver as defined in claim 25, wherein said filters are a plurality of filters provided for a plurality of the corresponding carrier signals so formed on the sender side not to interfere with each other both on the axis of frequency and the axis of time, the central frequencies of said plurality of filters being frequencies of said carrier signals and said filters letting through said carrier signals which will not interfere with each other both on the axis of frequency and the axis of time

28. A communication system in which a sender and a receiver are connected to each other, wherein the sender has:

a carrier signal generating means for generating a plurality of carrier signals with frequencies assuming values at specific intervals; and

a multiplication means for sending out on said transmission line the input signals with said carrier signals as carrier; and

wherein the receiver is provided with:

a transmission line characteristics measuring means for receiving the input signals sent with the carrier signals as carrier from the sender and for determining transmission line characteristics in the respective frequency bands of said plurality of carrier signals; and

a receiving signal synthesizing means for synthesizing said plurality of carrier signals on the basis of the measurement results by said transmission line characteristics measuring means.

29. A communication system in which the sender and the receiver are connected to each other, wherein the sender has:

characteristics measuring means in said receiver.

Sub D5 } 32. A communication system as defined in claim 29, wherein there is further provided in either the sender or the receiver a selection control means for controlling said encoder with regard to the intensity distribution at the time of transmission among said plurality of carrier signals on the basis of the transmission characteristics on said transmission line of the respective carrier signals determined by said transmission line characteristics measuring means in said receiver.

Sub B1 } 33. A communication system as defined in claim 28, wherein said sender is provided with a sending signal generating means comprising a carrier signal generating means and a multiplication means for each of a plurality of input signals, and furthermore with a sending signal synthesizing means for synthesizing the outputs from the respective multiplication means.

34. A communication system as defined in claim 29, wherein said encoder in said sender selects a carrier to allot for each of a plurality of input signals.

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35. A communication system as defined in claim ²⁸~~33~~, wherein said sender or the receiver is further provided with a plurality of selection control means for controlling said plurality of carrier signal generating means with regard to the mixing ratio at the time of transmission of said plurality of carrier signals on the basis of the measurement results of the transmission characteristics on said transmission line of the respective carrier signals by said transmission line characteristics measuring means in said receiver.

Sub B1 } 36. A communication system as defined in any of claims ~~30 to 35~~, wherein said selection control means selects out of said plurality of carrier

is over said lower threshold value and/or said upper threshold value

43. A communication system as defined in claim 41, wherein said selection control means has a lower threshold value and/or upper threshold value stored therein and selects the carrier signals, the signal intensity of which is over said lower threshold value and/or said upper threshold value

44. A communication system as defined in claim 40, wherein said selection control means has threshold values defining a phase range stored therein and selects the carrier signals, the relative phase of which is within said threshold value range

45. A communication system as defined in claim 41, wherein said selection control means has threshold values defining a phase range stored therein and selects the carrier signals, the relative phase of which is within said threshold value range

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46. A communication system as defined in claim ³⁰~~39~~, wherein said signal intensity is detected by a plurality of filters for the frequency bands of the respective carrier signals.

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47. A communication system as defined in claim ³⁰~~39~~, wherein said relative phase is detected by a relative phase detection circuit detecting the difference between the angular signals obtained from said filters and a reference phase

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Sub 38 48. A communication system as defined in claim 46, wherein said filters are a plurality of filters provided for a plurality of the corresponding carrier signals so formed on the sender side as to satisfy orthogonal requirements other both on the axis of frequency and the axis of time, the

selection control means for controlling said carrier signal generating means in the respective sending signal generating means with regard to the intensity distribution at the time of transmission among a plurality of carrier signals according to the transmission characteristics on said transmission line of the respective carrier signals detected on the receiver side

Sub B3
6. A receiver as defined in claim 3 or claim 5, wherein said selection control means selects one signal to be put to said carrier signal generating means out of said plurality of carrier signals.

7. A receiver as defined in claim 3 or claim 5, wherein said selection control means effects uniform distribution in the mixing ratio among all the carrier signals to be put to said carrier signal generating means.

8. A sender as defined in claim 3 or claim 5, wherein said selection control means effects weighted distribution in the mixing ratio among all the carrier signals to be put to said carrier signal generating means on the basis of the measurement results of transmission line characteristics of the respective carrier signals.

9. A sender for use in a communication system in which the sender and the receiver are connected to each other via a transmission line, said sender comprising:

a sending signal generating means for converting the input signals into a plurality of carrier signals assuming values at specific intervals so as not to interfere with each other both on the axis of frequency and the axis of time and outputting the converted signals.

10. A sender as defined in claim 9, wherein said sending signal generating means comprises:

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an encoder for dividing one input signal into a plurality of the same signals as said input signal;

a plurality of filters, with said plurality of divided input signals as input, for outputting a plurality of signals with frequencies assuming values at specific intervals, said plurality of signals free from interfering with each other both on the axis of frequency and the axis of time; and

a sending signal synthesizing means for synthesizing the outputs of said filters.

11. A sender as defined in claim 10, wherein there is further provided a selection control means for controlling said encoder with regard to the intensity distribution at the time of transmission among a plurality of carrier signals according to the transmission characteristics on said transmission line of the respective carrier signals detected on the receiver side

12. A sender as defined in claim 10, wherein there is provided said encoder for generating the corresponding number of groups of divided signals from a plurality of input signals.

13. A sender as defined in claim 12, wherein there is provided a selection control means for controlling said encoder in said sending signal generating means with regard to the intensity distribution at the time of transmission among a plurality of carrier signals according to the transmission characteristics on said transmission line of the respective carrier signals detected on the receiver side.

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14. A receiver for use in a communication system in which the sender and a receiver are connected to each other via a transmission line, said receiver comprising:

a transmission line characteristics measuring means for receiving

carrier signals that the sender send in after converting the input signals into said carrier signals with frequencies assuming values at specific intervals and for determining transmission line characteristics in the respective frequency bands for said plurality of carrier signals; and

a receiving signal synthesizing means for synthesizing the outputs of said transmission line characteristics measuring means.

15. A receiver as defined in claim 14, wherein there is further provided a selection control means for controlling the intensity distribution among a plurality of carrier signals in synthesizing carrier signals at said receiving signal synthesizing means on the basis of the transmission characteristics on said transmission line of the respective carrier signals determined by said transmission line characteristics measuring means.

16. A receiver as defined in claim 15, wherein said selection control means selects signals to be put to said receiving signal synthesizing means out of said plurality of carrier signals.

17. A receiver as defined in claim 15, wherein said selection control means effects uniform distribution in the mixing ratio among all the carrier signals to be put to said receiving signal synthesizing means.

18. A receiver as defined in claim 15, wherein said selection control means effects weighted distribution in the mixing ratio among all the carrier signals to be put to said receiving signal synthesizing means on the basis of the measurement results of transmission line characteristics of the corresponding carrier signals.

19. A receiver as defined in claim 14, wherein a transmission line characteristics measuring means determines the signal intensity of said

an encoder for generating a plurality of signals from one input signal,

a plurality of filters for, with said plurality of divided input signals as input, outputting a plurality of signals with frequencies assuming values at specific intervals, said plurality of signals satisfying the orthogonal requirements both on the axis of frequency and the axis of time; and

a sending signal synthesizing means for synthesizing the outputs of said filters,

and wherein the receiver is provided with:

a transmission line characteristics measuring means for receiving said input signals and determining transmission line characteristics in the respective frequency bands of said plurality of carrier signals; and

a receiving signal synthesizing means for synthesizing said plurality of carrier signals on the basis of the measurement results by said transmission line characteristics measuring means.

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30. A communication system as defined in claim 28, wherein there is further provided with a selection control means for controlling said receiving signal synthesizing means with regard to the intensity distribution at the time of transmission among said plurality of carrier signals on the basis of the transmission characteristics on said transmission line of the respective carrier signals according to the measurement results by said transmission line characteristics measuring means.

31. A communication system as defined in claim 28, wherein there is provided in either the sender or the receiver a selection control means for controlling said carrier signal generating means with regard to the intensity distribution at the time of transmission among said plurality of carrier signals on the basis of the transmission characteristics on said transmission line of the respective carrier signals determined by said transmission line

signals ones to synthesize on the basis of the measurement results by said transmission line characteristics measuring means.

✓ 37. A communication system as defined in any of claims 30 to 35, wherein said selection control means effects uniform distribution in the mixing ratio among said plurality of carrier signals.

✓ 38. A communication system as defined in any of claims 30 to 35, wherein said selection control means effects weighted distribution in the mixing ratio among said plurality of carrier signals on the basis of the measurement results of transmission line characteristics of the respective carrier signals.

39. A communication system as defined in claim 35, wherein said transmission line characteristics measuring means determines the signal intensities in said plurality of receiver carrier signals.

40. A communication system as defined in claim 35, wherein said transmission line characteristics measuring means determines the relative phase in said plurality of receiver carrier signals in relation to a reference phase.

41. A communication system as defined in claim 35, wherein said transmission line characteristics measuring means determines both the signal intensities and the relative phase in said plurality of received carrier signals in relation to a reference phase.

42. A communication system as defined in claim 39, wherein said selection control means has a lower threshold value and/or upper threshold value stored therein and selects the carrier signals, the signal intensity of which

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central frequencies of said plurality of filters being frequencies of said carrier signals and said filters satisfying orthogonal requirements both on the axis of frequency and the axis of time

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